INFORMATION RECORDING DEVICE

Publication number: JP2000030369 (A)
Publication date: 2000-01-28
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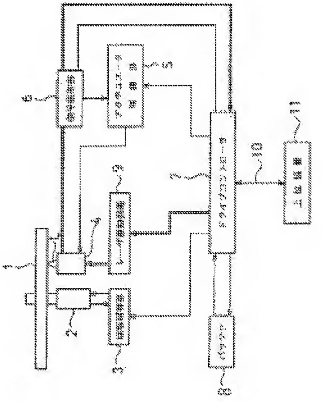
Classification:
- international: *G11B20/10; G11B7/00; G11B7/0045; G11B7/0055; G11B7/006;* G11B20/10; G11B7/00; (IPC1-7): G11B20/10; G11B7/00
- European:
Application number: JP19980197441 19980713
Priority number(s): JP19980197441 19980713

Also published as:
JP3394451 (B2)

Abstract of JP 2000030369 (A)

PROBLEM TO BE SOLVED: To make the final packet of a track, on which data are written, to be easily findable at the time of addingly recording data and also to prevent the write processing speed at that time from being lowered. SOLUTION: When a drive controller 7 performs the writing of data by dividing the track of an optical disk 1 into plural packets, the controller writes erase blocks of a prescribed number continuously with the final block of the final packet in which data are written and it recognizes a packet in which next blocks of the final block of the disk 1 are erase blocks of the prescribed number as the final packet of the track.



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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention]This invention relates to information storage devices, such as an optical disk recording device which records data on optical discs, such as CD-R and CD-RW.

[0002]

[Description of the Prior Art]Methods of forming a track in the recording surface of optical discs, such as a CD disk and a DVD disk, and writing in data include a Track-AT-Once (Track At Once:TAO) method. This TAO method is the method of writing in data, without interrupting one track.

[0003]On the other hand, there is the method of writing in called a packet writing (PACKET WRITE) method. This packet writing method is the method of dividing one track into two or more packets, and writing in data. Thus, by dividing into two or more packets, buffer under-run can be prevented or small data can be written in now. This buffer under-run is that a buffer becomes empty, the data which should be written in the next is lost since data transfer with an upper device is late, and the writing of a track goes wrong.

[0004]usually, the ending address of the packet written in at the end, when adding a postscript to the track on which data was written in by the packet writing method, since only the information on a track is written in an optical disc. [find for example] Since the writing of a packet is a postscript like the optical disc write-in method (refer to JP,8-147702,A) of writing the data of a packet unit in optical discs, such as CD-R, and performing file management, finally it is always data writing **** -- if there is no data writing **** after a packet, it will not become.

[0005]

[Problem(s) to be Solved by the Invention]However, when a postscript was added to the rewritable optical disc of a CD-RW disk etc. and the data of the track written in before remained, it became difficult to find the ending address of the packet written in at the end, and there was a problem of a postscript becoming impossible normally.

[0006]In order to find correctly the ending address of the packet written in at the end, there is the method of eliminating the data of a track beforehand, but. Usually, although elimination of data was performed by writing in the block ("erase blocks" is called) showing elimination, when there was much data volume which must stop having had to write in tales doses of erase blocks to the data volume written in before, and was written in before, there was a problem that elimination took time.

[0007]This invention is made in view of the above-mentioned point, and it enables it to find easily the final packet of the track which wrote in data at the time of a data postscript, and aims at preventing the fall of the writing processing speed at that time.

[0008]

[Means for Solving the Problem]In an information storage device which performs writing and read-out of data to an optical disc which can rewrite data in order that this invention may attain the above-mentioned purpose, When dividing a track of the above-mentioned optical disc into two or more packets and writing in data, A means which writes in erase blocks of a predetermined number after a final block of a final packet which wrote in data, and a means to recognize a packet whose following blocks of a final block of the above-mentioned optical disc are erase blocks of a predetermined number to be a final packet of a track are formed.

[0009]In an information storage device which performs writing and read-out of data to an optical disc which can rewrite data, When dividing a track of the above-mentioned optical disc into two or more packets and writing in data, A means to memorize beforehand an address of a final block of a final packet of a track of the above-mentioned optical disc, When judged as a final packet by means to judge whether a packet after data writing is a final packet of a track after writing of data of a packet to the above-mentioned optical disc based on the above-mentioned address, and its means, It is good to form a means which writes in erase blocks of a predetermined number after a final block of the final packet.

[0010]In an information storage device which performs writing and read-out of data to an optical disc which can rewrite data, When dividing a track of the above-mentioned optical disc into two or more packets and writing in data, it is good after specified time elapse after data writing to form a means which writes in erase blocks of a predetermined number after a final block of a final packet of a track of the above-mentioned optical disc.

[0011]In an information storage device which performs writing and read-out of data to an optical disc which can rewrite data, When dividing a track of the above-mentioned optical disc into two or more packets and writing in data, it is good at the time of disk discharge after data writing to form a means which writes in erase blocks of a predetermined number after a final block of a final packet of a track of the above-mentioned optical disc.

[0012]In an information storage device which performs writing and read-out of data to an optical disc which can rewrite data, When writing data in the above-mentioned optical disc continuously by a packet writing method, After detecting a notice of a write end by means to detect a notice of a write end from an upper device, and its means, it is good to form a means which writes in erase blocks of a predetermined number after a final block of a final packet of a track of the above-mentioned optical disc.

[0013]

[Embodiment of the Invention]Hereafter, this embodiment of the invention is concretely described based on a drawing. Drawing 1 is a figure showing the composition of the information storage device which is one embodiment of this invention. This information storage device is provided with the roll control part 3 which controls revolving speed by changing the number of rotations of the motor 2 made to rotate the optical discs 1, such as a CD-RW disk which can rewrite data, with arbitrary revolving speed, and its motor 2.

[0014]The optical pickup 4 which irradiates the recording surface of the optical disc 1 with semiconductor laser (laser beam) L at the time of information (data) record and data reproduction, It has the actuator control parts 5 which move the optical pickup 4 to the radial direction of the optical disc 1, and the signal controlling part 6 which detects the signal from the optical pickup 4.

[0015]ROM which stored various programs for CPU and its CPU to perform various kinds of processings, The microcomputer which consists of RAM etc. of the work area used when CPU performs various kinds of processings realizes, and manage control of this whole information storage device, and. It has the drive controller 7 which performs writing of the data based on the packet writing method concerning this invention, and processing of read-out.

[0016]It has the laser drive circuit 9 which controls the exposure of laser beam L of the optical pickup 4 by the buffer 8 which stores temporarily the data of the packet transmitted from the upper devices 11, such as a host computer, and the directions sent from the drive controller 7.

[0017]And the interface with the upper device 11 which controls this information storage device was managed, and it has the external interface 10 which performs the data between the upper device 11 and the drive controller 7, and transmission and reception of a command. Although a graphic display is omitted, it also has a mechanism part which discharges the optical disc 1, and the optical disc 1 is discharged by the drive controlling by the drive controller 7.

[0018]Namely, when the above-mentioned drive controller 7 grade divides the track of the optical disc 1 into two or more packets and writes in data, The function of the means which writes in the erase blocks of a predetermined number after the final block of the final packet which wrote in data, and a means to recognize the packet whose following blocks of the final block of the packet of the optical disc 1 are erase blocks to be a final packet of a track is achieved.

[0019]When dividing the track of the optical disc 1 into two or more packets and writing in data, A means to memorize beforehand the address of the final block of the final packet of the track of the optical disc 1, When judged as a final packet by means to judge whether the packet after data writing is a final packet of a track after the writing of the data of the packet to the optical disc 1 based on the above-mentioned address, and its means, The function of the means which writes in the erase blocks of a predetermined number after the final block of the final packet is achieved.

[0020]When dividing the track of the optical disc 1 into two or more packets and writing in data, the function of the means which writes in the erase blocks of a predetermined number after the final block of the final packet of the track of the optical disc 1 is achieved after the specified time elapse after data writing.

[0021]When dividing the track of the optical disc 1 into two or more packets and writing in data, the function of the means which writes in the erase blocks of a predetermined number after the final block of the final packet of the track of the optical disc 1 is achieved at the time of the disk discharge after data writing.

[0022]When writing data in the optical disc 1 continuously by a packet writing method, After detecting the notice of a write end by means to detect the notice of a write end from the upper device 11, and its means, the function of the means which writes in the erase blocks of a predetermined number after the final block of the final packet of the track of the optical disc 1 is achieved.

[0023]Drawing 2 is a figure showing the track format which recorded data by the packet writing (Packet Write) method of the optical disc 1. Usually, although the writing of data to the optical disc 1 was performed by the track unit, since a track number is a maximum of 99, the method of writing in called a packet writing method came to be performed.

[0024]As shown in drawing 2, a packet writing method divides the user data area 21 of the track 20 into two or more blocks (a "packet" is called) 22, and writes in data. Thus, the writing of short data can be enabled, data volume written in at once can be lessened further, and generating of buffer under-run can be prevented.

[0025]Drawing 3 is a format figure with which explanation of the basic block of the optical disc 1 and a sane block is presented. The data division of data and parity stores those with 2352 byte, and 1 block. "S0" and "S1" express an alignment pattern.

[0026]There are P, Q, R, S, T, U, V, and a W channel in subcoding, and when an information storage device controls and displays the data of the optical disc 1 (Control/Display), it uses.

[0027]P channel is used as the track separator (Track Separator). Q channel has still finer control (Control) information. A R-W channel is used for the purpose special as an object for audio disks.

[0028]1 block comprises 98 frames and data is recorded on the optical disc 1 in order of a frame. That is, it records in the frame synchronization of the frame 0, subcoding, data, parity, frame synchronization subcoding of the frame 1 and data, parity, and the turn that is ......

[0029]And the information on data blocks, such as a position (time) of an audio, data, and a block, is included in the subcoding Q, and the data block of the erase blocks showing having eliminated the block in it is also contained in it, for example. Therefore, when it writes in by performing this setting out, it means eliminating that block.

[0030]Next, the packet writing processing of this information storage device is explained.

(1) Packet writing processing which writes in the erase blocks of a predetermined number after the final block of the final packet of a track [0031]Drawing 4 is a flow chart which shows the packet writing processing which writes in the erase blocks of a predetermined number after the final block of the final packet of the track in this information storage device.

[0032]A drive controller writes in the data block of the packet specified from the upper device at Step (shown in a figure "S") 1, progresses to Step 2, and it is judged whether it is a data block write end, If it is not an end, the above-mentioned processing will be repeated, if it is an end, the erase blocks of a predetermined number are written in after the data block (final block of the final packet which wrote in data) of the packet which progressed to Step 3 and wrote in data, and this processing is ended.

[0033]And when the following blocks of the final block of the final packet of the track of an optical disc are erase blocks of a predetermined number at the time of the writing of a packet [as opposed to an optical disc in a drive controller], The final block of the above-mentioned final packet recognizes it as the final packet of the track concerned, and adds data from the following block of the final block of the final packet.

[0034]Thus, since the erase blocks of a predetermined number are written in after the final block of the final packet which wrote in data, Next, when recording data, the final block of the final packet of the track with which data was already written in based on the existence of the erase blocks of a predetermined number can be found easily.

[0035]Since the erase blocks of a predetermined number are written in after the final block of a final packet, even if it does not eliminate all the data of a track beforehand, the final block of the final packet of the track with which data was already written in at the time of data recording can be found easily.

[0036]Therefore, this information storage device can find easily the final block of the final packet which wrote in the data of the track at the time of a data postscript, and can prevent the fall of the writing processing speed at that time.

[0037]Next, there is the method of writing data in a packet unit at random like a hard disk or a floppy disk as how to write in the data based on a packet writing method. The packet written in at random in the optical disc in which data was written in by this method is not necessarily a final packet of a track.

[0038]Therefore, if the erase blocks of a predetermined number are written in after the packet written in at the end as mentioned above in the case of the optical disc in which the packet was written in at random, the problem of eliminating accidentally the data of the packet which exists after that will arise.

[0039]Then, after judging whether it is a final block of the final packet of the track concerned at the time of the writing of a packet and checking with the final block of a final packet, it is good to write in the erase blocks of a predetermined number after the final block of the final packet.

[0040](2) Packet writing processing drawing 5 which checks the final block of the final packet of a track and writes in the erase blocks of a predetermined number is a flow chart which shows the packet writing processing which checks the final packet of the track in this information storage device, and writes in the erase blocks of a predetermined number.

[0041]A drive controller checks the final address of the final packet of the track which writes in the packet of an optical disc at Step 11, progresses to Step 12, and it is judged whether it is finishing [acquisition of the final address of a final packet], If it is ending with acquisition, if it is not ending with acquisition, it will progress to Step 14, and it progresses to Step 13, and the final address of the above-mentioned final packet will be acquired, and it will progress to Step 14.

[0042]The data block of the packet specified from the upper device at Step 14 is written in, The address of the block which he followed to Step 15 and was written in at the end, and the address of the final packet of the track acquired beforehand are checked, and it is judged whether the packet which he followed to Step 16 and was written in at the end is a final packet of a track.

[0043]If it is not a final packet in judgment of Step 16, processing will be ended, if it is a final packet, it progresses to Step 17 and the erase blocks of a predetermined number are written in after the data block (final block of a final packet) of a packet, and processing is ended.

[0044]Thus, since the erase blocks of a predetermined number are continued and written in after judging the final block of the final packet of a track and checking that it is a final block, Even when writing in a packet at random, the final packet of a track can be found, and it can prevent eliminating the data of other packets accidentally by the erase blocks of a predetermined number.

[0045]Next, there is the method of writing in two or more packets continuously as the packet write-in method of the same track. By this method, when a packet is continuously written in a track, in above-mentioned packet writing processing, erase blocks will always be written in after the final block of a packet.

[0046]It becomes impossible therefore, to write in the following packet after a front packet, Since it seeks again to a writing position, i.e., the erase blocks written in after the final block of a front packet, and must stop having to write in anew, the problem that writing processing speed becomes slow arises.

[0047]Then, even if it carries out specified time elapse after record of a packet, after checking that the next packet writing is not performed, it is good to write in the erase blocks of a predetermined number after the final block of a final packet.

[0048](3) Packet writing processing drawing 6 which writes in the erase blocks of a predetermined number after the final block of the final packet of a track after predetermined time passes after packet writing, After predetermined time passes after the packet writing in this information storage device, it is a flow chart which shows the packet writing processing which writes in the erase blocks of a predetermined number after the final block of the final packet of a track.

[0049]A drive controller writes in the data block of a packet at Step 21, It progresses to Step 22 and judges whether specified time elapse was carried out after the data block write end of a packet, and while predetermined time does not pass, it is judged whether it progresses to Step 24 and the next packet writing processing is performed.

[0050]That is, even if it goes through predetermined time in judgment of Steps 22 and 24, when not performing the writing of the following packet, it progresses to Step 23, the erase blocks of a predetermined number are written in after the final block of the final packet of a track, and this processing is ended.

[0051]When performing writing processing of the following packet before predetermined time passes in judgment of Steps 22 and 24, the writing processing is performed and it returns to Step 22. And even if it goes through predetermined time in judgment of Steps 22 and 24, when not performing the writing of the following packet, it progresses to Step 23, the erase blocks of a predetermined number are written in after the final block of the final packet of a track, and processing is ended.

[0052]Thus, since the erase blocks of a predetermined number are written in after the final block of a final packet after specified time elapse after the write end of a packet, Since it is not necessary to write in the erase blocks of a predetermined number for every writing of a packet, and to perform seek operation to a writing position again when writing in a packet continuously, the fall of packet writing processing speed can be prevented.

[0053]Next, it may be made to write in the erase blocks of a predetermined number after the final block of the final packet of a track at the time of optical disc discharge.

[0054](4) Packet writing processing drawing 7 which writes in the erase blocks of a predetermined number after the final block of the final packet of a track at the time of optical disc discharge, It is a flow chart which shows the packet writing processing which writes in the erase blocks of a predetermined number after the final block of the final packet of a track at the time of the optical disc discharge in this information storage device.

[0055]At the time of disk discharge processing, a drive controller judges ****** after the write end of a packet at Step 31, if there is nothing, will progress to Step 33 after the write end of a packet, will discharge an optical disc promptly, and it ends this processing. If it is after a packet write end in judgment of Step 31, it progresses to Step 32, and the erase blocks of a predetermined number are written in after the final block of a final packet, it progresses to Step 33, an optical disc is discharged, and this processing is ended.

[0056]Thus, since the erase blocks of a predetermined number are written in after the write end of a packet at the time of disk discharge, Since a packet can be continuously written in even if it is not necessary to write in the erase blocks of a predetermined number after a final block for every writing of a packet and does not perform seek operation to a writing position again, in writing in a packet continuously, the fall of packet writing processing speed can be prevented.

[0057]Next, it may be made to write in the erase blocks of a predetermined number after the final block of the final packet of a track based on the notice of a packet write end from an upper device.

[0058](5) Packet writing processing drawing 8 which writes in the erase blocks of a predetermined number after the final block of the final packet of a track based on the notice of a packet write end from an upper device, It is a flow chart which shows the packet writing processing which writes in the erase blocks of a predetermined number after the final block of the final packet of a track based on the notice of a packet write end from the upper device in this information storage device.

[0059]A drive controller writes in the data block of a packet at Step 41, It is judged whether it progressed to Step 42 and there was any notice of a write end from an upper device, The notice of a write end from an upper device is detected, if it judges that there was a notice of a write end, it will progress to Step 43, the erase blocks of a predetermined number will be written in after the final block of a final packet, and processing will be ended. By judgment of Step 42, if there is no notice of a write end from an upper device, processing will be ended, without writing in the erase blocks of a predetermined number.

[0060]Thus, based on the notice of a write end of the packet from an upper device, the final block of a final packet can be judged correctly, Since a packet can be continuously written in even if it is not necessary to write in the erase blocks of a predetermined number after a final block for every writing of a packet and does not perform seek operation to a writing position again, in writing in a packet continuously, the fall of packet writing processing speed can be prevented.

[0061]Since the writing of the erase blocks of a predetermined number can be quickly started after the writing of a final packet based on the notice of a write end of the packet from an upper device, writing processing of erase blocks can be performed at high speed.

[0062]

[Effect of the Invention]As explained above, it enables it to find easily the final packet of the track which wrote in data at the time of a data postscript according to the information storage device by this invention, and the fall of the writing processing speed at that time can be prevented.

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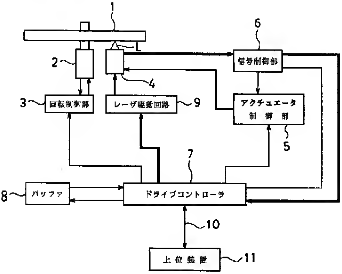
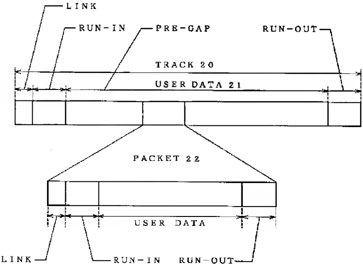
DRAWINGS

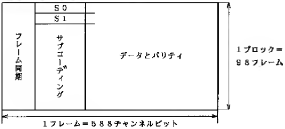
[Drawing 1]


1
6
L
2
4
信号制御部
3
回転制御部
レーザ駆動回路
9
アクチュエータ制御部
5
7
8
バッファ
ドライブコントローラ
10
上位装置
11

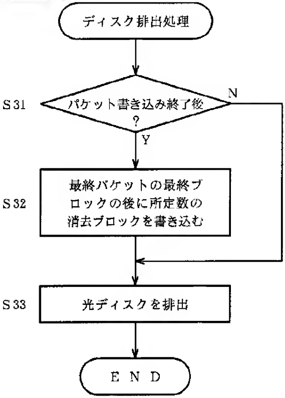
[Drawing 2]


LINK
RUN-IN
PRE-GAP
RUN-OUT
TRACK 20
USER DATA 21
PACKET 22
USER DATA
LINK
RUN-IN
RUN-OUT

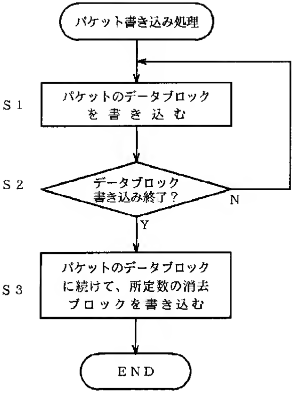
[Drawing 3]


S０
S１
フレーム同期
サブコーディング
データとパリティ
１ブロック＝
９８フレーム
１フレーム＝５８８チャンネルビット

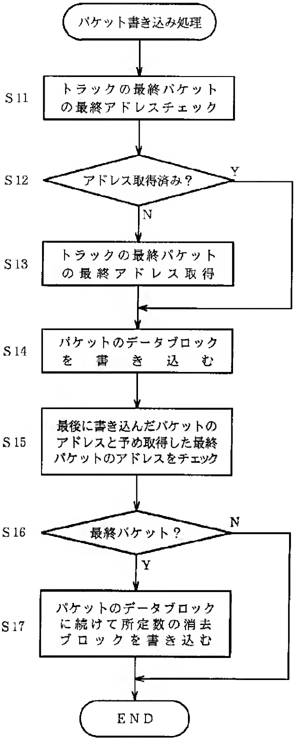
[Drawing 7]


ディスク排出処理
S31
パケット書き込み終了後？
N
Y
S32
最終パケットの最終ブロックの後に所定数の消去ブロックを書き込む
S33
光ディスクを排出
END

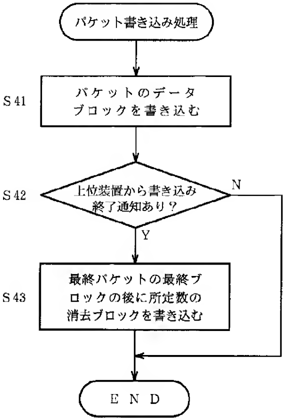
[Drawing 4]


パケット書き込み処理
S 1
パケットのデータブロックを書き込む
S 2
データブロック書き込み終了？
N
Y
S 3
パケットのデータブロックに続けて、所定数の消去ブロックを書き込む
END

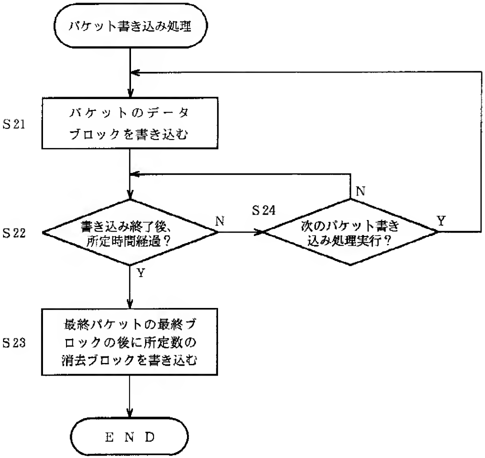
[Drawing 5]


パケット書き込み処理
S11
トラックの最終パケットの最終アドレスチェック
S12
アドレス取得済み？
Y
N
S13
トラックの最終パケットの最終アドレス取得
S14
パケットのデータブロックを書き込む
S15
最後に書き込んだパケットのアドレスと予め取得した最終パケットのアドレスをチェック
S16
最終パケット？
N
Y
S17
パケットのデータブロックに続けて所定数の消去ブロックを書き込む
END

[Drawing 8]


パケット書き込み処理
S41
パケットのデータブロックを書き込む
S42
上位装置から書き込み終了通知あり？
N
Y
S43
最終パケットの最終ブロックの後に所定数の消去ブロックを書き込む
END

[Drawing 6]


パケット書き込み処理
S21
パケットのデータ
ブロックを書き込む
S22
書き込み終了後、
所定時間経過？
N
S24
次のパケット書き
込み処理実行？
N
Y
Y
S23
最終パケットの最終ブ
ロックの後に所定数の
消去ブロックを書き込む
END

[Translation done.]